

Combat climate change – do open innovation methods help?

Abstract: *Meanwhile a multiplicity of enterprises is accepting the challenge of climate change and is developing various solutions and activities to combat climate change or at least to mitigate its risks. Yet, sustainable development needs change and open innovation methods can enforce it. How can open innovation methods, such as stakeholder dialogues, (open) innovation workshops, ideas competitions, web-communities and tool-kits, enable companies to find new and sustainable solutions and activities to combat climate change? This article addresses this question based on an empirical qualitative analysis of companies.*

The possibility to enlarge the knowledge base and to open perspectives in ad-hoc or continuous communication with consumers and stakeholders is a great advantage of open innovation methods for companies. This can open up corporate learning as well as responsible consumption. However, these open innovation methods have different dialogue orientations and different levels of participation and therefore diverse possibilities to support combating climate change. This study highlights the strengths and weaknesses of selected open innovation methods to combat climate change on the basis of an empirical analysis of 13 mainly German-based companies.

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Introduction

One of the critical questions for managers, policy-makers and other stakeholders is the importance of innovation and organisational learning in order to influence corporate responses to climate change. Climate change requires more than technical innovation and improvement. To guarantee a “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland 1987) societal change, the creation of new institutions and green technologies are necessary (Ghosh 2001; Ghoshal et al. 2000). Climate change presents fundamental challenges to prevailing business models as companies trying to implement sustainable and climate-oriented requirements may find their conventional way of operating fundamentally challenged (Walsh 2006):

- Processes and products need to be changed fundamentally
- Completely new information and ways of thinking need to be integrated into management decision-making processes
- New ways of external and internal communications with groups of stakeholders need to be identified and implemented
- Companies’ basic values and knowledge systems need to be changed.

These challenges will, for the majority of all companies, require new or recombined knowledge or ideas and fundamental changes in corporate strategy and objectives (Teece et al. 1994; Arnold 2007). Therefore, the use of open innovation methods and organisational learning become a key element of any effort to implement climate protection and sustainability effectively within companies.

Although there is an extensive literature on the actions that have been taken by companies, such as developing new modes of production and new products, initiating new modes of participation or stakeholder engagement, less attention has been paid to the role that open innovation methods and organisational learning play in influencing

the specific actions taken by companies. The wide variations in corporate responses to climate change open up a series of questions around:

- When and why open innovation methods pursue processes of learning and change to integrate sustainability and climate protection into business practices and strategies
- What effect these innovations generated by open innovation methods have (in terms of reducing companies' greenhouse gas emissions)
- What open innovation methods promote or inhibit in the process of combating climate change and organisational learning

Even though the management studies literature provides answers to these questions in the broader context of corporate strategy, little has been written specifically on climate change and sustainable development in general. Given the weaknesses in the theoretical frameworks, this chapter seeks to advance the literature by examining empirical evidence from thirteen mostly German-based companies in the fields of housing, construction, transport, and information and communication technology (ICT) that have used open innovation methods to develop climate-protecting or sustainability innovations. The article consists of seven sections: sustainable and climate change, open innovation methods, conceptual framework, methodology, results, conclusions and consequences.

Sustainable and climate change

Due to a global increase in mechanization and the social development of societies, human activities reached new levels and scope in time and space causing complex risks (Arnold 2007). In order to face and manage these risks in a responsible way, using lifecycle and long-term perspectives, sustainable development aims at, in economic terms an efficient, in social terms a fair, and in environmental terms a compatible,

development. The idea of sustainable development confronts firms with several new challenges. Some of the main sustainable requirements are (1) implementing and realizing the national sustainability and climate-protection strategy, (2) including the interests of different stakeholder groups, (3) changing routines and processes towards more sustainability and climate protection, (4) considering long range consequences, (5) generating and offering sustainable and climate-protecting solutions, and (6) focussing on lifelong and sustainable- and climate-protecting-oriented learning.

While many articles dealing with sustainable development acknowledge the role of new knowledge and its diffusion in the company, literature for the most part neglects the role of learning and change processes in the implementation of new concepts. Most approaches concentrate on instrumental aspects and the development of new management concepts or tools, rather than highlighting the conditions and the dynamics of how such instruments and concepts can be successfully realized in companies (Arnold 2007). In the context of sustainability, companies' decision making has to be long-term and sustainable. According to the regulative view of sustainability, mutual learning processes lead to more sustainable patterns of action (Hübscher and Müller 2001). In general, this kind of learning also includes stakeholders. If firms accept and use the interests of stakeholders for their product and service development, their strategies and their corporate development, as well as for the initiation of interactive learning processes, open innovation methods will serve as a chance for accelerating sustainable development in society in the long run.

Renn and Webler (1996) argue that even environmental problems are suitable for cooperative processes, because these procedures need collective binding arrangements that are neither deduced from the rationality of experts nor legitimated by the use of political routines. That is why in stakeholder dialogues companies discuss particular and/or structural problems that result from business activities with

stakeholders (Hansen et al. 1997). The dialogue's focus is set on reducing social and environmental impacts and improving entrepreneurial routines and processes towards more sustainability. Analyzing open innovation methods means considering if new or changed action patterns have led to far reaching entrepreneurial learning processes or if these methods are part of a green washing campaign.

This argumentation follows Argyris and Schön's (1996) idea of organisational learning; a change in the behavior of the organisation or its members that is triggered by the often tacitly used set of values and causal beliefs that members of an organisation share. In their systems theory view, Probst and Büchel (1997: 15) define organisational learning as "the process by which the organization's knowledge and value base changes, leading to improved problem-solving ability and capacity for action". This definition integrates the outcome perspective by asserting that organisational learning has to serve a specific purpose. In this context, sustainability-oriented learning is defined as entrepreneurial changes based on changes in knowledge and values which are supported by reflexive and/or emergent processes. The concept of sustainability serves as a fundamental framework in this context.

Open innovation methods

With respect to open innovation methods, various stakeholders representing different social positions and interests, such as NGOs, investors, government bodies or consumers, can be discerned. Open innovation methods are all methods that open the traditional way of innovating. Traditionally, new products and services were developed by the companies themselves. Nowadays, in research and practice these 'closed processes' have been opened up. Stakeholders and companies increasingly interact and act as shared innovators (von Hippel 1978 & 1988). The new basic principle is called 'open innovation' - a process to combine external and internal competences in the

innovation process by using different methods (e.g. innovation workshops, idea contests). Previous research has shown the effectiveness of this approach (Franke et al. 2006; Lilien et al. 2002). To realise open innovation, companies can use a number of methods (Urban and von Hippel 1988; Lüthje and Herstatt 2004): A stakeholder dialogue offers a tool to engage people in a serious discussion about a special theme (Arnold 2007). Moreover, they offer a designed and facilitated process for groups to initiate dialogue with those persons and institutions (e.g. companies) that have a stake in their activities. Innovation workshops are interactive meetings that provide a practical framework and structured approach for generating and discussing sustainable solutions that deliver breakthrough results. A web community is a virtual group that takes the form of a social network, an internet forum, a group of blogs, or other kinds of web applications to interact, share knowledge or develop issues (Franke and Shah 2003; Piller et al. 2005). An idea contest is a forum in which persons with a special interest in the topic can generate and hand in creative ideas or concepts with regard to a certain topic defined by an organizer, e.g. the company (Walcher 2007, Piller and Walcher 2006); Toolkits (Franke and Piller 2004; von Hippel 2001).

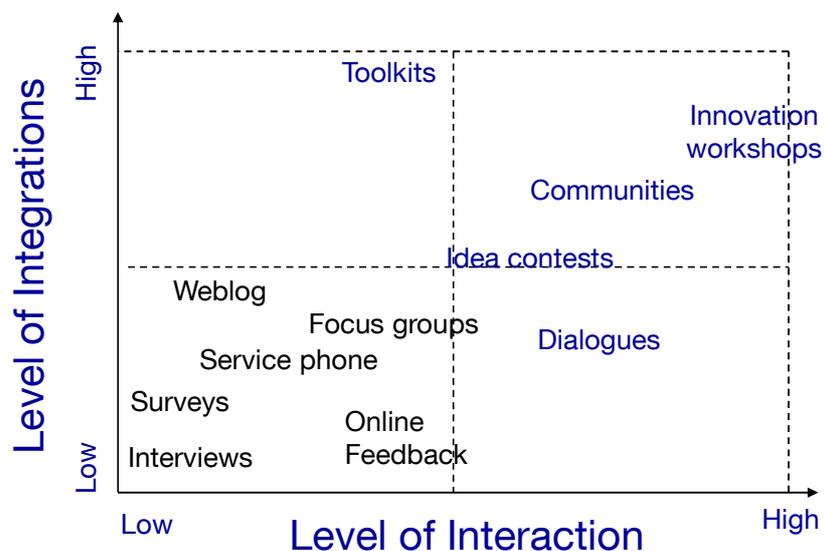


Figure 1. Open Innovation Methods

All these methods are characterized by dialogue processes. In the context of sustainability mostly environmental and social standards, sustainable strategies and investments are discussed. As companies have to accomplish certain duties and responsibilities in society, in general, open innovation methods have several functions and goals (Boehnke 1998; Hansen and Bode 1999; Osmers 2004) such as: providing information, promoting the mutual understanding of positions and interests and enlarging the knowledge base, finding and discussing realizable solutions. This means opening perspectives in ad hoc or continuous communication and opening up sustainability oriented corporate learning and changing processes, legitimating corporate responsibility and obtaining and improving entrepreneurial image, selecting authoritative decisions, holding-up decisions and generating uncertainty.

The functions of dialogues or interactive processes are based on several theoretical streams. In communication studies, fruitful dialogue processes are characterized by a shared problem definition or a shared understanding of the objectives to be achieved. Brainstorming and the exchange of ideas and interests therefore become part of the process (Hansen and Raabe 1991). In this respect, dialogues are constitutive, because the conditions and the knowledge needed to solve problems emerge while searching cooperatively for solutions (Bechmann 1997). Motivation, attitudes, objectives and knowledge of the participants – even hidden and unconscious ones – appear in the process (Hansen et al. 1996; Kenber and Salter 2002).

Referring to systems theory, dialogue processes do not aim at consensus or at producing securities, but at agreeing on acceptable or sustainable degrees of uncertainty (Luhmann 1989). The function of bindingly engaging in procedures to make decisions is to generate uncertainty by retarding decisions. This is more an expressive than an instrumental function, because these proceedings generate the current security of action patterns with no guarantee for success (Luhmann 1989). Therefore, dialogue processes

or open innovation methods also use this paradox: Making sustainable decisions means firstly to retard decisions and to generate uncertainty in order to cause a current security of action patterns. During this phase of insecurity in the context of communication, it is secondly possible to attain the assurance of the dimension of future uncertainty.

Regarding the results and objectives dialogues can be classified into different levels of participation or interaction and integration. There is not one perspective to the sharing of decision-making with the company. At present, there is no generally accepted framework of participation or stakeholder integration. Yet, Green and Hunton-Clarke (2003) developed a typology of participation that refers to community or public participation based on public communication for risk management. Three company participation levels are distinguished that represent three steps of stakeholder involvement: informative, consultative and decisional participation.

Informative participation describes the transfer of knowledge. The main focus is giving and receiving information. When stakeholders' interests, views, values and attitudes are not explored during an informative stakeholder dialogue these facts are interrogated in a consultative participation. The focus is on mutual understanding of positions. Decisional participation represents the highest level of involvement because stakeholders participate in the actual decision-making processes. This level of participation is characterized by an early involvement and interaction between the company and the stakeholders in the decision-making processes.

The level of participation and stakeholder interaction depend on the company's situation, its spirit and purpose as well as the problems to be solved, the dialogue risks and the aimed results. To make target-oriented decisions before starting a dialogue process, companies should reflect their expectations and their reasons when conducting a dialogue process and the companies should agree on their commitments. The companies should also beware of an anticlimax, e.g., if the aimed results are not

reached, these cost-intensive and time-consuming dialogue processes will be deprecated by the stakeholders (Ferdinand 2004). Klein and Steinert (2004) emphasize the sustainability of agreements. If concessions are retracted, relations, networks and image will be damaged badly, even more than before the dialogue process.

Conceptual Framework in light of theoretical Background

Although some firms successfully used open innovation methods for years, it is hard to find in practice ongoing dialogues, such as dialogues in which products, strategies or product-related environmental and social criteria are discussed, for example in workshops, in panel discussions or company-based communities (Foster and Green 2000; Hansen and Raabe 1991). A great advantage of sustainability-oriented or climate-related dialogues is the possibility to expand the knowledge base and to open perspectives on ad-hoc or continuous communication with stakeholders (Hart 2007). This can open up sustainability oriented corporate learning as well as changing processes. Early participation in product or service development, for instance, enables a company to include customers' practical and contextual knowledge into its strategies and action patterns (Piore et al. 1994). Thus, firms can open up additional sustainable potentials during the use phase of their goods (Hage and Hoffmann 2004). Moreover, different corporate culture types have a different dialogue orientation and therefore diverse possibilities to support sustainable development.

Firms have different and special abilities to act in a sustainable manner and due to their peculiar history and/or corporate culture their "level of initiated participation will ultimately depend on priorities, culture and values of the company" (Green and Hunton-Clarke 2003). Hence, it is of interest how participation or cooperation has an influence on climate-protecting activities. In addition, innovation can change the world: Do open innovation methods really lead to more sustainable or climate-protecting

innovation? Are interactive innovations better innovations? To identify relevant aspects in the emergence of sustainable learning, innovation and cooperation while using open innovation methods, a conceptual framework has been developed (Figure 2).

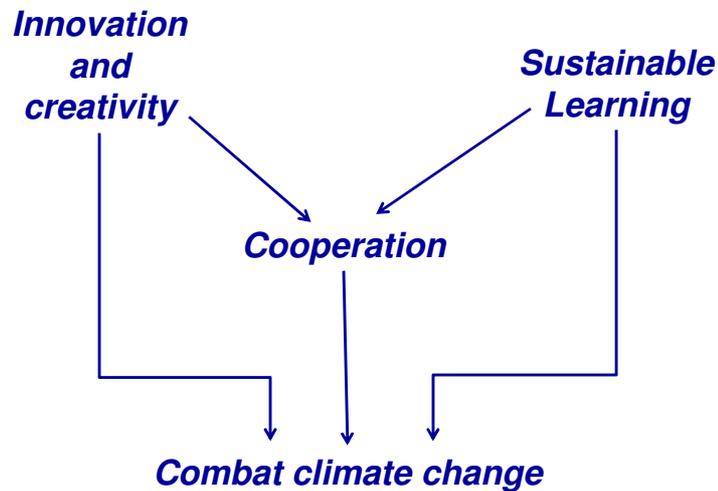


Figure 2. Analytical framework for combating climate change

The fundamental assumption in this article, that has to be proved, is that participation or cooperation, innovation and sustainable learning enables companies to find better sustainable solutions to combat climate change. Great changes are to be expected when dialogue processes focus on transferring and creating new and sustainable knowledge into the organisation. These processes can also change the customers' behavior. Nevertheless, according to Hansen et al. (1996), this kind of corporate sustainable change needs a cultural fit in some respects. The goal of this empirical research is to study dialogue processes with customers in where open innovation methods are being/have been used and to study what factors strengthen sustainable change.

Methodology

Based on the analytical framework, this study aims at finding causal relationships between sustainable learning, cooperation, innovation and climate-protecting corporate activities. The study concentrates on open innovation methods. For that purpose, several examples of open innovation methods were analyzed. The research involved empirical analyses of 13 German companies as follows:

- two large companies in the field of building and habitation (services supplier, household appliance company)
- four small and medium-sized companies in the field of building and habitation (construction companies, apartment management companies)
- three large companies in the field of communication and information (international computer manufacturer, international electronics company, print and information services)
- two large companies in the field of mobility (internationally operating transportation and logistics company, internationally operating transportation company)
- two small and medium-sized companies in the field of mobility (public transport company, internationally operating urban mobility and services company)

The companies were selected because of their engagement in sustainable products or processes in the three defined activity fields/ industries. In addition, case selection was based on the companies' demonstrated efforts in using open innovation methods. All analysed dialogue processes had to contain the following aspects:

- Interaction between customers and company representatives
- Mutual understanding of positions, values or knowledge transfer
- High reference to sustainability or climate protection and improving environmental impact

Guidelines, questionnaires, face-to-face interviews, telephone interviews and action research were used to obtain information of the dialogue processes using open innovation methods. This field study has employed semi-structured and thematically focused interviews, which were supported by desktop studies of related documents and action research (Mayring 2002; Yin 1994). In the period of March 2003 until now, a total of 38 persons from communication departments, management, R&D, marketing and sustainability or environmental units were interviewed. In total, 10 stakeholder dialogues, 8 innovation workshops, 7 web-communities, 2 idea contests and 1 toolkit were analysed.

Questions concerning sustainable learning were: including the different stakeholders' interests, generating sustainable solutions or new climate-protecting products and services, changing intraorganisational routines and processes, implementing and realising sustainable-oriented dialogue processes, etc. The questions that analysed the cooperation focused on: motive, purpose and participants of dialogues, level of customer participation, participation of company representatives, significance and specificity of sustainability or climate-related issues, etc. Concerning innovation and creativity it was of interest if the companies generated new and climate-protecting products or services, if stakeholders required climate-protecting issues directly, and in which way the products and services improved. These main points are an extract of the investigation and literature research of previous participation and dialogue processes.

For data preparation, minutes, recordings, transcriptions and the composition of categories were used. Content analysis was used to interpret the data (Yin 1994). Data analysis used a coding system according to the analytical framework, meaning each of the factors was operationalized by several codes (Mayring 2003). A code system of cause-effect combinations was developed to identify the conditions for the emergence of climate-protecting activities. The qualitative case study design used allowed the

analysis of complex social topics such as participation and culture change with a focus on sustainable development. The study's qualitative design targeted subjective perceptions and attributions of the individuals studied.

Results

For many companies it is new to accept and implement the non-market requirements of various stakeholders in their strategies and action patterns and to have transparent stakeholder communication. There are some relations between sustainable learning, innovation, cooperation and climate-protecting activities. With respect to the companies sustainable learning obviously leads to an increase in knowledge concerning:

- User needs and interests
- User preferences of product and service features
- Products' contribution to climate change
- Role and success factor of users in innovation management
- Methods to analyse user needs

However, the main question remains: How is newly acquired knowledge distributed and anchored in the company?

On the consumers or stakeholders' side there is an increase in knowledge concerning:

- Products and services, and their difficulties regarding adoption of user needs
- Sustainable behavior or consumption decision

The analysis also showed that consumers can become prosumers. But, do they want to?

The corporate freedom to develop climate-friendly products and services depends partly on the interaction with stakeholders or the cooperation. In each case cooperation could be improved. The companies accepted the stakeholders and consumers as competent actors and experts of every-day life containing using and solving knowledge as well as knowledge on products/services. Most companies made good experience with open

innovation tools, and thus invited the customers to exchange further ideas. Especially in innovation workshops new products have been adopted to the user's needs. Therefore, the consumers realised their role in product and service development. Sometimes the consumers also tried to increase their climate-friendly behavior. However, it is critical that very often users bring in their ideas, but they have no rights concerning their submitted ideas (except for some prizes).

Regarding sustainable or climate-protecting innovations and creativity it can be stated that open innovation methods have a different level of interaction or dialogue orientation and therefore diverse possibilities to support a sustainable development and climate-protecting activities. In tendency, the higher the level of interaction the more precise sustainable solutions are. Creativity does not depend on the level of integration or interaction, creativity mostly depends on the people and the problem to be solved. However, sustainability has to be addressed directly by all methods. Sustainability and climate-protection are not an issue of methods or tools, but an issue of multicausal complexity which cannot be solved within a workshop or dialogue process. And it gets even more complex if there are filtering mechanisms due to companies' constraints.

Conclusions and Discussion

This empirical study focused on the question how open innovation methods can enable companies to find new and sustainable solutions, and thus combat climate change. Despite the small sample size, this survey allows some conclusions on the relationship between innovation, cooperation, sustainable learning and climate-protecting activities. As shown in Ernst/Kohn's (2007) research the front end of innovation processes is strongly influenced by the cultural orientation of an organization. Regarding the analytical framework four major conclusions emerge:

First, there is some evidence that open innovation methods or sustainable-related dialogue processes facilitate climate-protecting activities. From an economical point of view, the success of dialogue processes is governed by institutionalisation. Ongoing interaction enables companies to monitor trends and to understand the stakeholders' attitudes and values better. They are also necessary to acquire purposeful background information. If dialogue processes are to be institutionalized, the method chosen needs to be considered carefully. Inviting different stakeholders to a costly arranged dialogue for only a chat will seldom be efficient. For such situations, online-fora, communities or toolkits are more accurate. However, companies tend to not use open innovation methods in difficult situations or conflicts.

Second, open innovation methods are used to implement sustainability, new knowledge, experiences and capabilities into organizations (see also Ernst/Kohn 2007). As the organisational change initiated by interaction and cooperation depends on the organisation's internal structure and leadership, a systemic transfer is necessary. Diverse liability of the level of interaction and integration causes different organisational penetration of the learning processes. To anchor sustainability or the awareness of climate change in businesses permanently dialogue processes are not enough. Organisational structures are necessary to pass and implement the attained information, knowledge and learning effects into the organization as well. This is supported by Walther's (2004) empirical studies that indicated that there is a higher level of organizational learning aptitude or ability in companies that have a well-organised innovation management. Transfer of changed knowledge bases, assumptions, values and capabilities is supported by structure and by culture. Moreover, Walther also observed that sustainability-oriented knowledge, and therefore changed basic beliefs and assumptions, can be implemented effectively in the organization by adequate

structures and cultural elements. Therefore, dialogue-oriented leadership, coaching, platforms and sustainability boards are of high value (Goodpaster 2007).

Third, dialogue initiated intra-organisational learning processes take time due to past processes and history. The reason for this is the strong coordinative and administrative leadership (Clarke 1994). If leadership of very adaptive and innovative managers and change agents that are formal and hierarchical collide, new knowledge, beliefs and capabilities will not be anchored in the whole company. Although there are many changes and high learning processes within management, little participation and knowledge sharing will not initiate sustainable development on the level of operations. Although the organizational members can adopt new routines and knowledge, it does not concern the changed capabilities. Particularly in Hierarchies, the presence and the membership of executives gain in importance. The more these executives leave the company, the more the company loses sustainable knowledge and changed beliefs. Moreover, the less sustainable knowledge and capabilities can be transferred, the less new and sustainable interpretive and action patterns appear.

Forth, most sustainable-oriented dialogue processes were made or open innovation methods were used to legitimate corporate responsibility and to improve corporate image. The fear of loss of reputation is essential. That means dialogue results are often integrated in sustainability reports as well as in communication. Yet, dialogue results should be integrated in processes, product innovation, concepts and visions. According to Ferdinand (2004), these are the main factors of successful use of open innovation methods. The transfer and implementation of sustainable knowledge into the organisation takes place by top-down strategies, norms, platforms and project work and/or interdisciplinary teamwork (see also Kluge et al. 2007). So, implementing dialogue results into the company often requires the management or change agents.

Therefore, establishing dialogue processes and the use of open innovation methods often requires new managers.

Consequences

Open innovation methods will not change the world, but they can initiate changes towards more sustainability or climate-protecting activities. With the help of open innovation methods or dialogue processes new views emerge which enable companies to initiate sustainable change. Change can be made easier by open innovation. But how does open innovation or how do dialogue processes support sustainability and climate-protection? Together with stakeholders, companies can negotiate their own interests and those of stakeholders. Thus, sustainable development is strengthened and responsibility is located in a new manner (Mark-Ungericht 2004). With regard to efficiency and core competences, it is not clear whether and when open innovation methods are useful (Zerfaß 1996). In addition, there are difficulties and risks for companies, especially when the dialogue results are not directly noticeable for customers or for stakeholders in general, such as newly structured intra-organizational processes or the leaving out of toxic materials in the production process.

Enabling sustainable learning processes does not depend on the level of cooperation. Even the trustful exchange of single positions and the deeper understanding of different interests already serve as a platform where sustainable development can be initiated (Stiegnitz 1997). Nevertheless, it is necessary to implement open innovation effects and results (such as structural and cultural change, new forms of leadership, group work and platforms) into organisations. The focus should not only be on platforms but also on human resource development, especially regarding team work and project work. Hansen and Raabe (1991) emphasize that the reason for stakeholder participation in product development is more often a strategic

decision than an immediate result of the company's environment. To initiate climate-protecting activities, change agents (managers and executives) with a high sustainability and climate-protecting orientation are not enough; cooperative leadership is also necessary. In total, combating climate change – open innovation methods help, but it depends...

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